

Research Article

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Risk Factors Associated with Higher Injection Drug Use and HIV Rates: Findings from Saskatchewan, Canada

John Moraros^{1*}, Jacey Falconer², Marla Rogers³ and Mark Lemstra⁴

¹Assistant Professor, School of Public Health, University of Saskatchewan, Canada

²Student, School of Public Health, University of Saskatchewan, Canada

³Researcher, School of Public Health, University of Saskatchewan, Canada

⁴Adjunct Professor, School of Public Health, University of Saskatchewan, Canada

Abstract

Background: Over the last decade, the incidence of positive HIV test reports within the Saskatoon Health Region (SHR), Saskatchewan, and Canada has been rapidly rising. Injection drug use (IDU) has been widely recognized as the major etiological factor for this increase. This study sought to assess the prevalence, characteristics, and risk indicators of higher risk injection drug use (HR IDUs) in comparison to lower risk injection drug use (LR IDUs) within the SHR, Saskatchewan, and Canada.

Methods: This is a cross sectional study. Study participants were selected over an eight month period spanning from 2009 to 2010. During that time period current IDUs (n = 603) were interviewed and stratified into either the HR IDUs (n = 182) or LR IDUs (n = 421) categories depending on their drug use behaviours and needle and paraphernalia sharing practices.

Results: This study found that HR IDUs were more often engaged in giving sex to get drugs and giving drugs to get sex than LR IDUs. HR IDUs also had significantly more sexual partners and a higher frequency of injection than LR IDUs. Logistic regression analysis, determined three covariates that independently predicted being a HR IDU including homelessness, having experienced sexual assault as a child, and lack of knowledge related to HIV/AIDS.

Conclusions: The findings of the present study provide valuable information to health care professionals and a useful context based on which public health initiatives can be designed to specifically target IDUs, who are most at risk in developing HIV and subsequently transmitting the disease.

Keywords: Injection drug use; Risk factors; HIV/AIDS; Aboriginal populations; Canada

Introduction

Over the last decade, there has been a rapid and disconcerting rise in the number of HIV positive test reports in the Saskatoon Health Region (SHR), Saskatchewan, and Canada. There were 16 HIV positive test reports confirmed in 2004, followed by 39 in 2005, 53 in 2006, 57 in 2007, 77 in 2008, and 94 in 2009. The annual incidence of positive HIV test reports in 2008 in the SHR was more than three times the national average in Canada (31.3 and 9.3 per 100,000 population respectively) [1]. In 2008, 76.9% (133 of 173) of the positive HIV test reports in Saskatchewan were associated with injection drug use (IDU) [2]. In comparison, Canada had only 18.9% of the positive adult HIV test reports attributed to IDU in 2008 [3].

Recent studies in Vancouver and Saskatoon, Canada also found that the mode of transmission of HIV has changed considerably. In the past, HIV was primarily transmitted through unsafe sexual practices whereas presently transmission is mainly attributed to sharing of contaminated injection drug equipment among injection drug users (IDUs) [4,5]. As such, IDUs who engage in high-risk HIV behaviours play a critical role in transmitting this viral infection. Specific high-risk HIV activities among IDUs include frequent injections and sharing of syringes or equipment [6]. In Vancouver, independent risk variables of needle sharing included difficulty obtaining sterile needles, requiring help to inject drugs, needle reuse, and frequency of injection [7].

High-risk injecting behaviours have an impact on HIV incidence, but the social context under which IDUs engage in these behaviours is also important [8]. This is evident when needle sharing remains a

common practice among IDUs even after needle-exchange programs become available [7]. Demographic characteristics of IDUs such as marital status, socio-economic status, and education have been associated with HIV risk behaviours, as well as HIV-related knowledge [5,9]. In addition, the social setting of drug use carries unique risks since injection behaviour can be learned from observing more experienced IDUs [10].

The present study greatly adds to our body of knowledge on this important topic in several meaningful ways. Currently, the underlying causes of the risk indicators that lead the majority of people diagnosed with HIV in Saskatchewan to be IDUs have not been clearly defined. Secondly, there are no studies in Canada that attempt to initially differentiate and then compare IDU prevalence, behaviours, and characteristics on the basis of higher risk injection drug use (HR IDU) as opposed to lower risk injection drug use (LR IDU). Finally, this study determines both the unadjusted and adjusted risk indicators that lead

***Corresponding author:** John Moraros, MD, PhD, MPH, School of Public Health, University of Saskatchewan, 107 Wiggins Road Saskatoon, SK S7N 5E5, Canada, Tel: +306-966-8578; E-mail: john.moraros@usask.ca

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one to become a HR IDU, including demographics, socio-economic status, significant life events, and HIV/AIDS-related knowledge.

Methods

Study design

This was a cross sectional study conducted in the SHR, Saskatchewan, and Canada. Ethics approval was obtained from the University of Saskatchewan Behavioral Research Ethics Board (BEH# 08-53).

Study setting

The present study was conducted by the Saskatoon Tribal Council and the University of Saskatchewan's School of Public Health. From the months of September 2009 to April 2010, residents at-risk for contracting HIV were recruited from the SHR, Saskatchewan, and Canada to participate in this study.

Participants

Only adult's ages 18 years old or older, who gave both written and informed consent participated in the study. Eligible residents included current injection drug users, sex trade workers, people who frequently used the services of the sex trade, or men who had sex with other men.

Respondents were given a \$20 honorarium for participating in the survey.

Survey instrument

The survey used in the present study consisted of 175 questions taken from pre-existing validated questionnaires. It was used to measure demographics, socio-economic status, knowledge, attitudes, and behaviours, barriers to services, depressed mood and significant life events of those at-risk for HIV.

A current injection drug user was defined as someone who answered yes to the question "Have you injected a drug in the last 4 weeks?" IDUs were further divided into HR IDUs and LR IDUs. An IDU was classified as higher risk if he or she answered frequently or sometimes to injecting with needles that have already been used by a sexual partner, friend or acquaintance, or a stranger; using someone else's filter, water, or bleach; drawing up from a used spoon or container; or using a container that someone else keeps used syringes in within the past 30 days. These questions came from the Injecting Risk Questionnaire (IRQ) which has been found to have an overall reliability of .93 and a Cronbach's alpha between .88 and .90 [11].

Demographic and socio-economic status information was collected using questions taken from the Risk Behaviors Assessment

	Higher Risk IDUs (%)	Lower Risk IDUs (%)	P-value
During the past 4 weeks, how often have you...			
Injected with a syringe that was already been used by a sexual partner?			.000
Frequently or sometimes	59.4	0.0	
Hardly ever	12.2	18.1	
Never	28.3	81.9	
Injected with a syringe that had already been used by a friend or acquaintance?			.000
Frequently or sometimes	35.1	0.0	
Hardly ever	17.0	11.6	
Never	47.8	88.4	
Injected with a syringe that had already been used by a stranger?			.000
Frequently or sometimes	25.2	0.0	
Hardly ever	14.3	5.3	
Never	60.4	94.7	
Filled your syringe that had already been used by somebody else?			.000
Frequently or sometimes	33.9	0.0	
Hardly ever	17.8	9.5	
Never	48.3	90.5	
Drawn up from a spoon into which someone else had put a used syringe?			.000
Frequently or sometimes	56.1	0.0	
Hardly ever	24.7	17.8	
Never	19.2	82.2	
Used a filter which someone else had put a used syringe?			.000
Frequently or sometimes	38.5	0.0	
Hardly ever	19.6	9.8	
Never	41.9	90.2	
Used the same water or bleach as someone for flushing or cleaning?			.000
Frequently or sometimes	50.2	0.0	
Hardly ever	15.6	15.7	
Never	34.1	84.3	
Used old syringes that were kept in the same container as someone else's old syringes?			.000
Frequently or sometimes	29.9	0.0	
Hardly ever	19.9	10.4	
Never	50.3	89.6	
	N=182	N=421	

Table 1: Prevalence of Injection Drug Use Behaviours by IDU Risk Category.

Questionnaire created by the National Institute on Drug Abuse. This questionnaire was used in both the Vancouver Injection Drug User Study (VIDUS) and the At Risk Youth Survey (ARYS) projects [4,12-14]. The reliability of the survey in regards to IDUs reporting their own socio-economic status was deemed to be acceptable (kappa coefficients = .78 to 1.00) [15].

Participant's HIV/AIDS-related knowledge was measured using a series of 28 true and false questions. These questions were taken from the Health and Relationships Survey, AIDS Preventive Behaviors, which has been found to have a reliability alpha ranging from .68 to .72 [16].

Behaviors associated with increased risk of HIV infection,

such as trading sex, number of sex partners, frequency of injection, and sharing of injecting equipment were measured using the Risk Behaviors Assessment (RBA) Questionnaire. The RBA Questionnaire asks whether a participant has ever traded sex for drugs, traded sex for money, or traded drugs for sex. The Spearman correlations for these questions are $r = .66$, $r = .72$ and $r = .78$ respectively [17].

Statistical analysis

Cross tabulations were performed with chi square tests initially between demographics, socioeconomic status, significant life events, HIV/AIDS-related knowledge, and other HIV risk behaviours by risk category among IDUs. After these initial cross tabulations, hierarchical well formulated binary logistic regression was used to determine the

	Non- IDUs (%)	Higher Risk IDUs (%)	Lower Risk IDUs (%)	*P-value
Gender				.541
Male	63.2	56.4	53.6	
Female	36.8	43.6	46.4	
Age category				.866
18 – 29	28.7	26.5		
30 – 39	27.6	35.9	34.7	
40 – 69	43.7	37.6	36.5	
Sexual orientation				.039
Straight	89.6	85.2	91.1	
Bisexual, gay or lesbian, two-spirited, other	10.4	14.8	8.9	
Marital status				.325
Single (never married)	59.1	57.2	51.2	
Married or common law	23.6	30.6	32.5	
Separated/divorced, widowed or other	17.3	12.2	16.3	
Cultural status				.919
Caucasian or other	17.0	11.5	11.2	
Aboriginal (First Nations, Métis or Inuit)	83.0	88.5	88.2	
Highest level of school completed				.528
Grade 8 or less	12.1	21.4	17.5	
Grade 9-12 but no high school graduation	62.3	53.8	55.6	
Completed secondary or post-secondary	25.6	24.7	26.9	
Living arrangements				.814
Own home or apartment	42.4	38.3	41.1	
Someone else's home or apartment	41.8	45.0	45.3	
Somewhere else	15.8	16.7	15.4	
Homeless				.004
Yes	15.8	44.0	31.2	
No	72.3	56.0	68.8	
Employment				.871
Unemployed	50.6	54.1	53.7	
Working part-time or full-time	11.0	7.2	9.3	
Disabled, not able to work	21.2	25.4	24.8	
Something else	17.2	13.3	12.2	
Sources of income				
Paid job, salary or business	16.2	9.3	9.8	.876
Social security, disability, Workmen's comp	41.3	45.6	41.1	.325
Sell or trade goods, barter	4.2	6.6	9.2	.309
Illegal or possibly illegal activity	4.7	15.0	11.5	.280
Prostitution	1.7	14.3	7.4	.012
Other	24.7	24.7	29.9	.212
Annual household income				
\$0 - \$9,999	71.8	75.6	68.2	.093
Average annual household income	\$7,812	\$8,415	\$10,017	
	N=397	N=182	N=421	

Table 2: Demographics and Socio-economic Status of Non-IDUs, Higher Risk IDUs and Lower Risk IDUs.

	Non- IDUs (%)	Higher Risk IDUs (%)	Lower Risk IDUs (%)	*P-value
Experienced:				
Physical assault or abuse in their adult life by their partner	53.9	65.9	59.3	.144
Physical assault or abuse in their adult life by someone other than their partner	55.4	68.4	56.9	.011
Physical assault or abuse as a child	60.1	70.5	65.0	.218
Seeing people hitting or harming one another in their family while growing up	76.6	86.3	81.9	.210
Sexual assault in their adult life	33.0	44.1	35.8	.068
Sexual assault as a child	47.7	59.7	49.8	.035
Seeing someone physically assaulted or abused	74.6	82.0	81.4	.870
Seeing someone seriously injured or violently killed	53.2	56.9	59.6	.552
Losing a child through death	27.0	33.3	27.7	.187
Death or permanent separation from a parent or someone who was like a parent before 18 years of age	44.8	52.6	50.9	.718
Death of a spouse, partner, or loved one as an adult	47.7	52.1	57.2	.274
Attended a Residential School	27.0	32.9	34.4	.738
Had a parent or grandparent who attended Residential School	62.4	63.2	66.6	.452
	N=397	N=182	N=421	

*P-value has been calculated by comparing the Higher-Risk and Lower-Risk IDUs groups

Table 3: Comparison of Significant Life Events of Non-IDUs, Higher Risk IDUs and Lower Risk IDUs

association between the outcome variable of being higher risk IDU (in comparison to being a lower risk IDU) and all potential explanatory variables. The unadjusted effect of each covariate was determined and then entered one step at a time based on changes in the -2 log likelihood and the Wald Test [18]. The final results are presented as adjusted odds ratios with 95 percent confidence intervals.

Results

There were 1,000 at-risk individuals who participated in this study, 603 of whom identified them as an IDU. This sample represented 76.6% of the known IDUs currently residing in Saskatoon, as identified by service information provided by the SHR [18]. Of these 603 participants, 182 (30.2%) were categorized as HR IDUs. Of the 182 HR IDUs, examples of high risk behaviours included 59.4% frequently or sometimes injecting with a syringe that was already used by a sexual partner, 56.1% frequently or sometimes drawing up from a spoon into which someone else had put a used syringe, and 50.2% frequently or sometimes using the same water or bleach as someone else for flushing or cleaning their syringe (Table 1).

The majority of the study participants, irrespective of intravenous drug use (i.e. non-IDUs) and risk group category classification (i.e. HR vs. LR IDUs) were male, between the ages of 40-69 years old, heterosexual, single, and self-identified as being Aboriginal. Additionally, they had less than a grade 12 education; did not own their own home or apartment; were unemployed, had a source of income from social assistance, and had an annual household income of less than \$10,000 (Table 2).

By specifically comparing the two risk groups (i.e. HR vs. LR IDUs) it was determined that prostitution as a source of income was more prevalent within the group of HR IDUs than LR IDUs (14.3% and 7.4% respectively). Moreover, 75.6% of HR IDUs had an annual household income between \$0-\$9,999 compared to 68.2% of LR IDUs, although this difference was not statistically significant. However, significant differences did exist on the basis of sexual orientation and homelessness with more HR IDUs being bisexual, gay, or lesbian and homeless when compared to LR IDUs (14.8% vs. 8.9% and 44.0% vs. 31.2% respectively) (Table 2).

The majority of the study participants, irrespective of intravenous

drug use (i.e. non-IDUs) and risk group category classification (i.e. HR vs. LR IDUs) experienced multiple significant life events such as physical assault or abuse in their adult life; physical assault or abuse as a child; seeing people hitting or harming one another in their family while growing up; seeing someone physically assaulted or abused; and having a parent or grandparent who attended Residential School (Table 3).

In particular, HR IDUs were significantly more likely than LR IDUs to have been physically assaulted or abused in their adult life by someone other than their partner (68.4% compared to 56.9%) and more likely to have been sexually assaulted both as a child (59.7% compared to 49.8%) and as an adult (44.1% compared to 35.8%) (Table 3).

Insofar as HIV/AIDS knowledge was concerned, HR IDUs were significantly more likely to incorrectly answer as true the following two HIV-related knowledge statements "pregnant women are safe from getting HIV infection" and "pulling out the penis before a man climaxes keeps a woman from getting HIV during sex" when compared to LR IDUs. Furthermore, the risk behavioral variables that differed significantly between HR and LR IDUs included giving sex to get drugs and giving someone drugs to have sex (Table 4).

After multivariate regression analysis, the three statistically significant independent risk indicators for being a HR IDU, in comparison to a LR IDU, included experiencing sexual assault as a child, being homeless, and incorrectly answering the statement, "pulling out the penis before a man climaxes keeps a woman from getting HIV during sex" (Table 5).

Discussion

It is critical that HIV prevention interventions are targeted to the highest-risk IDUs, such as those who are at highest risk of HIV infection and overdose [19]. Despite this importance, very few research articles have attempted to separate higher and lower risk IDU. The present study adds to the literature by: a) outlining the underlying causes of the risk indicators of being infected with HIV, b) initially separating and then comparing the characteristics and practices of higher and lower risk IDUs, and c) determining the covariates that are independently associated with the risk indicators of HR IDU.

	Higher Risk IDUs (%)	Lower Risk IDUs (%)	P-value
Knowledge Variables:			
Pregnant women are safe from getting HIV infection			.041
True	9.3	4.7	
False	90.7	95.3	
Pulling out the penis before a man climaxes keeps a woman from getting HIV during sex			.049
True	13.4	8.0	
False	86.6	92.0	
Other Risk Variables:			
Ever given sex to get money			.349
Yes	39.8	35.6	
Ever given sex to get drugs			.002
Yes	42.9	29.3	
Ever given someone drugs to have sex with you?			.026
Yes	20.9	13.4	
How many people have you had oral, anal or vaginal sex with in the past 30 days?			.096
0 people	24.3	31.8	
1 or 2 people	54.3	52.9	
3 or more people	21.4	15.3	
Frequency of injection in past 30 days			.621
< 60 times	74.7	76.7	
61+	25.3	23.3	
	N=182	N=421	

Table 4: HIV/AIDS-related Knowledge and Risk Behaviour Differences between Higher Risk IDUs and Lower Risk IDUs.

	OR	95% Confidence Interval	P-value
Independent variables:			
Consider self to be homeless... Yes	1.75	1.19 – 2.59	.005
Pulling out the penis before a man climaxes keeps a woman from getting HIV during sex... True	1.94	1.05 – 3.60	.035
Sexual assault as a child... Yes	1.48	1.01 – 2.18	.047

Reference categories:
 Does not consider self to be homeless
 Pulling out the penis before a man climaxes keeps a woman from getting HIV during sex... False
 No sexual assault as a child
 Hosmer-Lemeshow test = .995
 Nagelkerke R Squared = .047

Table 5: Independent Risk Indicators of being a Higher Risk IDU in SHR.

The risk indicators of being infected with HIV among IDUs have been previously studied. It has been reported that HIV is associated with injection drug use frequency, the practice of injecting with used needles, the frequency of injecting cocaine, and sharing needles with others [8,20]. In this study, the researchers observed an epidemiological shift in the underlying causes of the risk indicators among HIV infected individuals in the SHR, Canada from men having sex with men to heterosexuals, predominately whites to predominately Aboriginals, middle/high SES to low SES, and mainly a sexual mode of transmission to mainly an IDU mode of transmission.

The practice of IDU is rapidly increasing in the SHR, Saskatchewan, Canada, among all sociodemographic sectors and especially among its Aboriginal population [5]. This in large part helps explain the concomitant increases in HIV prevalence rates observed in the region during the last decade.

In the present study, the main characteristics of HR IDUs were highly reflective of their injecting behaviours and practices. Our findings indicate that HR IDUs were more likely to be drug-dependent, inject with others, and share injecting equipment when compared to LR IDUs. These findings are widely supported in the literature. A study conducted in the US found higher rates of injection risk behaviour

among IDUs who reported injecting with others and sharing injection equipment [21]. Our findings help highlight the importance of making clean needles and syringes easily accessible to IDU in the SHR if we are to successfully combat the rapid rise in HIV rates.

Lastly, the present study determined which covariates are independently associated with HR injecting practices in the SHR, Saskatchewan, and Canada. The first independent risk factor for being a HR IDU was having experienced sexual assault as a child. Previous studies have also found an independent association between injection drug use and childhood sexual abuse, particularly age of initiation [22]. Our finding adds that sexual abuse as a child is not only a risk factor for earlier injection drug use, but also a risk factor for HR injecting. Since childhood sexual assault has been noted to account for one half to two thirds of serious problems with drug use, mental health interventions such as screening and treatment of sexual assault survivors may be necessary to prevent the victims from becoming IDUs who might test positive for HIV in the future [22].

Being homeless was also a risk indicator for HR IDU. This is consistent with previous studies that have found associations between HIV risk behaviours among IDUs and unstable housing [23]. It has been demonstrated that IDUs who have unstable housing are

independently associated with multiple HIV risk behaviours such as injecting with used needles and trading sex [23]. Developing a strong housing strategy that increases affordable housing programs could help stabilize the living environment of IDUs and increase access to better self-care.

Finally, we found that lack of knowledge about HIV transmission through sexual practices was also an indicator for HR injecting. This finding contrasts with other studies that have found that HIV knowledge levels do not have a significant association with engaging in HIV risk behaviour among IDUs [9,24].

These three independent covariates address the larger social context of injection drug use within the SHR, Saskatchewan, Canada. Substance abuse prevention alone is not sufficient, but post sexual assault and victimization services and housing stability must be part of a multi-faceted approach in order to improve the social-environmental context [22]. Public health education is also pertinent for HIV prevention and safe sex practices.

Limitations

There were a few limitations associated with this particular study. It was cross-sectional in nature, and therefore, unable to determine causation. Additionally, the results were based on self-reported information, although the questionnaires used were all valid and reliable.

Recommendations

The increase of HIV positive test reports in Saskatchewan, Canada, and the fact that the majority of new HIV cases are attributed to injection drug use, are concerning. These should be key areas of public health intervention. This study suggests that HR injecting is independently associated with three covariates: sexual assault as a child, homelessness, and lack of knowledge regarding HIV transmission. These independent variables represent vital areas for policy and program development for this vulnerable and hard to reach population.

The diverse and complex issues associated with HIV transmission and IDU in Saskatchewan, Canada continue to evolve [25,26]. The following recommendations may be of benefit in dealing with the unique dynamics of HIV and IDU in the study group: 1) Sexual assault victims be offered an opportunity to participate in peer outreach programs specifically designed to address the dangers of HIV transmission and IDU; 2) Support be provided for homeless individuals through grassroots initiatives and creative interventions to address their needs. These may include emergency housing provisions, drop-in centers, and safe houses; 3) Former drug users be involved in the HIV and IDU education of current injection drug users, individuals living high-risk lifestyles, and public health professionals; 4) That the unique issues regarding the spread of HIV transmission and IDU faced by Aboriginal peoples and especially its youth, be identified and addressed through non-judgmental, culturally appropriate, and Aboriginal led interventions; and 5) Further research be conducted in Saskatchewan on the sociocultural and economic factors (i.e. norms, attitudes, beliefs, biases) that influence high risk behaviors, injection practices, and lifestyles choices in the injection drug-using subculture in order to better inform public health professionals in the development of interventions in the areas of prevention, treatment, and evaluation.

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